

COLORADO CANYONS NATIONAL CONSERVATION AREA
Proposed Resource Management Plan
and Environmental Impact Statement

CHAPTER 4—ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter describes the potential impacts of the proposed resource management plan to the natural and human environment. A detailed impact analysis was accomplished using an interdisciplinary team (IDT) of BLM resource specialists who examined each of the four proposed alternatives, and each action within each alternative, to determine the potential impacts to the human environment that may occur with the implementation of the alternative. The conclusions reached through this analysis are based on the IDT's knowledge of resources and the project area, review of existing literature, and information provided by experts in the BLM or other agencies.

Only discussions on resource management actions that would have a potential impact on other resource areas are discussed in this chapter. If there is no impact, no discussion is included. Because resources within the Colorado Canyons National Conservation Area (CCNCA) are so broad and diverse, the planning area was divided into four major geographic planning areas – Mack Ridge, Rabbit Valley, the Colorado River Corridor, and the Wilderness. Each planning zone offers unique settings for recreation opportunities; therefore impact discussions are broken down where appropriate, not only by alternative but these planning zones as well.

The following terminology was used for the determination of impacts and incorporates intensity, context, and duration of impacts into the analysis of probable effects of alternatives:

Negligible: The impact is at the lower level of detection; there would be no measurable change.

Minor: The impact is slight but detectable; there would be a small change.

Moderate: The impact is readily apparent; there would be a measurable change that could result in a small but permanent change.

Major: The impact is severe; there would be a highly noticeable, long-term, or permanent measurable change.

Localized Impact: The impact would occur in a specific site or area. When comparing changes to existing conditions, the impacts would be detectable only in the localized area.

Short-Term Effect: The effect would occur only during or immediately after implementation of the alternative.

Long-Term Effect: The effect could occur for an extended period after implementation of the alternative. The effect could last several years or longer.

The analysis included determination of three types of impacts, where applicable: direct, indirect, and cumulative. Direct effects are those that are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or removed in distance but are still reasonably foreseeable. Cumulative effects are impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

All actions related to climate, air quality, and noise comprise implementation of regulatory requirements that are already in place and would result in minimizing the potential of any direct or indirect impacts to the environment. None of the alternatives would have a direct or indirect impact to these resources. In addition it has been determined that none of the alternatives would have any associated direct or indirect impact on geology, topography, forestry, or visual resources. None of the alternatives developed for this Resource Management Plan (RMP) have the potential to result in long-term, major impacts to the human environment.

4.2 Lands, Rights-of-Way, and Withdrawals

Impacts to rights-of-way (ROW) proposals would include some restrictions, additional costs, and/or denial of proposals. All ROWs would need to be designed to minimize or eliminate the impacts those projects may have on the CCNCA values identified through the original legislation (i.e., no ROW within designated wilderness) or through this resource management plan.

4.3 Soils

Increased use, mounting pressure on existing roads and trails, and the need for additional facilities and access routes would be the primary actions directly affecting soil resources and have the potential to increase the extent and quantity of soil loss, including biologic soil crusts. The application of Best Management Practices (BMP) and judicious placement of any added roads, trails, or facilities would minimize impacts on soils. Monitoring would play a large role in determining the levels of management employed. Reclamation and restoration projects would be implemented on priority areas not currently meeting land health standards and are designed to speed up the process of improving soils health in those areas.

4.4 Minerals and Energy Resources

Withdrawing lands within the CCNCA from all mineral and energy development should result in a long-term, positive impact to the natural and human environment. Withdrawal lessens the potential for ground disturbing activities and lessens the adverse impacts that go with such actions – erosion, soil damage, water sedimentation, weed infestation, fugitive dust, etc. Overall impacts should be beneficial, major, and long-term.

4.5 Water Resources

Impacts on water resources from realty, minerals, water, riparian, weed, and fire management activities are highly variable. Acquiring lands would facilitate management on a watershed scale. Surface disturbing activities could be controlled and the objective of meeting water quality standards emphasized. Consequently a minor long-term improvement in water quality, primarily from a reduction in sediment loading within the watershed could result.

Impacts from rights-of-way are a function of type of action and proximity to water resources. With the stipulations placed on the actions, no long-term impacts on water resources would occur. In the short term there may be localized minor increases in sediment and possibly salinity. Generally the impact is projected to be within the natural variation of the streams within the planning area. Mineral rights include a gravel pit near Fruita. The gravel pit is adjacent to the Colorado River and will soon be closed down. Reclamation would include shaping and reseeding the pit, which would reduce erosion and sedimentation impacts. A localized negligible improvement in water quality from reduced sediment in the Colorado River would occur. Water resource management would ensure that the water resource, including water quality, would be considered in all management actions. Mitigation would be worked into projects to ensure that water quality impacts are minimized and water quality standards are met in the

long term. Through working with the Grand Valley Selenium Task Force, the issue with elevated selenium levels in Salt Creek would be addressed. Water right acquisition would ensure that water is available for present and future management actions. The development of home sites south of the CCNCA on Glade Park is occurring, and that development could impact ground water within the CCNCA. A decrease in the flow of the springs emerging from the contact between the Wingate and Chinle Formations could occur. Many of those homes will be drilling wells, probably into the Wingate sandstone, to provide domestic water. With the constant recharge of the Wingate, low density of potential wells, low use rates, and abundant storage, a very minor drawdown in water table levels in the Wingate would result. With limited drawdown and the minimum 3-mile distance between the wells and springs within the CCNCA, a negligible impact on the yield of those springs is anticipated.

Management for functioning riparian areas would have a long-term minor beneficial impact on water quality. The stream banks would be protected that control stream scour, dissipate energy during high flows and allow for sediment trapping, which would control or limit sediment loading along river, stream and canyon reaches. Weed management activities would include the use of herbicides, according to label instructions, but should not result in water quality degradation. The release of bio agents, if approved, for large-scale reduction of tamarisk should not impact water quality. This assumes the tamarisk is replaced by sedges, rushes, willow, cottonwood, skunkbush sumac, and other desirable riparian species so riparian function is maintained, i.e. accelerated stream scour does not occur. In the long term, the inventory and subsequent treatment of weeds would eliminate competition and allow for reestablishment of native vegetation. This should offer improved vegetative cover in the uplands and provide for improved function of the riparian areas. A long-term, minor decrease in sediment levels in surface waters should result.

Fire can cause both long-term and short-term impacts on water quality. There could be a short-term increase in sediment and a nutrient flush within the impacted watershed. The primary impact would be sediment resulting from increased overland flow and channel scour, and would continue for weeks, months, or longer. In the long term the sediment yield would actually decrease from pre-treatment levels because of increased ground cover. A nutrient flush would include calcium, magnesium, and potassium, which are converted to oxides and deposited as ash on the soil surface. The oxides are low in solubility until they react with carbon dioxide and water of the atmosphere, forming bicarbonate salts. As salts they are more easily dissolved in surface runoff or by leaching. Sediment can also serve as a vehicle for phosphorus, calcium, magnesium, and potassium loss. The more vegetation removed the higher the intensity and duration of the flush. Most of the nutrients would be flushed during the first runoff, and the levels

would decrease dramatically as watershed conditions stabilize. Some of the nutrients would actually benefit the down-gradient vegetation by offering fertilizer benefits. Changes to the timing, quantity, and duration of flow in localized portions of a watershed could result from fire. This would occur from changes to interception, infiltration, soil moisture storage, possibly snow accumulation, and snowmelt rate. An increase in both the quantity of runoff, and the duration of the runoff period, could occur. This modification would be most pronounced the first year following the burn and would gradually return to pretreatment conditions as vegetation reestablishes.

Forestry management would not allow fuel woodcutting. This could result in a thinning of ground cover, including the density of grasses and reduction in litter. Erosion rates and sediment loading within the watershed could increase. With the dry nature of the area, the potential for impact to perennial waters would be low.

Management of paleontological resources would include collection by permit of scientifically important fossils, and no recreational collecting of common invertebrate and plant fossils. Generally these activities would not impact water resources. The dispersed nature of collecting activities, isolated locations for fossil collecting, and distance between those areas and water would limit water quality impacts. However, if collection activity increases to where vegetative cover is reduced, the sediment loading from that area would also increase. Impact to water resources would only occur if that sediment were carried from the upland areas to ephemeral and perennial waters.

Wildlife and range management actions would generally benefit water quality. Working with the Colorado Division of Wildlife (CDOW) to implement population management plans could improve watershed condition by controlling vegetative cover losses and limiting trampling impacts associated with high numbers of big game. This would generally result in a negligible to minor localized decrease in sediment and possible salinity impacts within the watershed. A limited number of habitat improvement projects would be developed. Some short-term localized water quality impacts from increased sedimentation could occur. The significance of impact would be a function of the type, size, and location of the project. Generally most water quality impacts would be mitigated, so impacts are projected to be negligible.

Grazing management could impact water quality within portions of a watershed. Generally when a grazing system is implemented, adequate water and fences are in place or developed to facilitate movement, thereby controlling overgrazing. Trampling impacts are controlled and vegetative cover and litter is maintained protecting the soil from accelerated erosion. Sediment, and potentially salinity impacts, are minimized. Allotments

without a plan may not have adequate water and/or pastures to facilitate movement, allowing localized areas to be overgrazed. Sediment generation is increased and water quality degradation may occur depending on the distance, slope, litter, and vegetative buffer between those areas and perennial water. Protecting Mee, Knowles, and Rattlesnake Canyons and the Colorado River allotment from grazing would allow the riparian vegetation to function by trapping sediment, dissipating energy during high flow, etc. Water quality is improved by minimizing channel erosion and facilitating sediment trapping. This minimizes sediment levels in the river and the canyons. A long-term minor decrease in sediment loading could occur.

Vegetation management has a goal of attaining desired plant communities and taking management actions to meet land health standards. This would provide for a healthy watershed condition. Good vegetative cover relative to the potential for each respective range site would result in minimal upland erosion. Consequently the sediment loading, and in some soils salinity loading from sheet and rill erosion, would be minimized. Tools used to obtain desired plant communities could range from changes in livestock or other management activities, to mechanical treatments, to herbicide applications, to seedings. Some techniques could result in a short-term minor localized increase in sediment depending on the type of soil, proximity to streams, slope within the treatment area, buffer between treatment area, and the streams. Sediment impacts would decrease rapidly as vegetative and litter cover is increased. Long term, the sediment levels would generally be lower than pretreatment levels.

Additionally, this plan allows for aggressive management, including siting considerations for roads and trails, and use of vegetation with a high likelihood of success. Consequently watershed protection would be maximized. This would result in a moderate long-term improvement in water quality, primarily from limiting sediment and in some cases salinity loading.

4.5.1 Water Resources Impacts from Recreation Management by Zone:

Mack Ridge Zone: The designation of use on routes would have a minor localized long-term beneficial impact on water quality. Motorized use would be reduced from existing levels by not allowing use on some trails. Impacts associated with motorized use would be eliminated, coupled with the limiting of trail-widening impacts. A reduction in sediment loading from those areas would occur. Use on most other trails would be limited to hiking, mountain biking, and, in some cases, equestrian. The closing and restoration of all non-designated trails would allow vegetative cover to become reestablished, which would offer additional soil protection. This

would reduce sediment potential from those areas. With the distance of these closures to perennial waters, the Colorado River and Salt Creek, and the small acreage involved, the reduction in sediment in perennial waters would be negligible. Continued motorized use on dirt roads may affect water quality in some locations. Increase in erosion may occur if expanded use causes trail widening. These areas are generally a mile or more from perennial waters so impacts would be negligible. Containment of parking areas would minimize the areas where vegetative cover is reduced and soil compaction increased. This would reduce impact from potential sediment loading within the watershed.

Rabbit Valley Zone: The designation of use on routes would not impact water resources. The closing and restoration of all non-designated trails would allow vegetative cover to become reestablished, which would offer additional soil protection. This would have a minor long-term reduction in sediment production from those areas. Containment of parking areas would maintain vegetative cover, also controlling sediment production. With the distance of these closures and parking areas to perennial waters, the Colorado River and Salt Creek, and the small acreage involved, the reduction in sediment would be negligible. Continued use of motorized use on dirt roads may affect water quality in some locations. Increased erosion may occur if accelerated use increases causing impact areas to widen. Some trails are currently producing sediment, primarily as a result of their location within or paralleling McDonald Creek and unnamed washes. The bedrock within the creek and washes are controlling down cutting. Stream scour is thereby controlled. A minor localized sediment impact would occur, however the impact to perennial water would be negligible. Dispersed camping could result in a decrease in vegetative cover and increased soil compaction, if a high level of use occurs. Erosion and potential sediment from those sources would increase, resulting in a long-term minor impact. Paving of trailheads and parking areas, and hardening of group campsites would eliminate sediment production from those areas. The hardening of surfaces can affect the runoff characteristics within a watershed. With the small percentage of Rabbit Valley affected, a negligible change in the timing, duration, and intensity of runoff is predicted. The relocation of routes would generally benefit watershed health. Widening of routes would be controlled, parallel routes closed, and area allowed to revegetate with a minor long-term net reduction in sediment production.

River Corridor Zone: Controlling group size may control impacts on the riparian areas. Having riparian vegetation along the river limits impacts from stream scour, which introduces sediment into the river. A negligible long-term reduction in sediment could occur. Requiring portable toilets controls water quality degradation associated with fecal coliform originating from human wastes. A localized negligible long-term reduction would occur. Requiring fire pans would limit escape campfire risk. Impacts on water quality from fire would be avoided (see the Impacts from Fire Management section). Additional protection to water quality would occur from the expanded requirement for fire pans and portable toilets. Human-caused fire starts, and coliform bacteria levels from human wastes should be correspondingly reduced.

Wilderness Zone: Potential impacts on water resources would be primarily fecal coliform and sediment impacts. Fecal coliform from human wastes could result from dispersed camping, while sediment would result from loss of vegetative cover resulting from camping, parking areas, and trail or road erosion. With the dispersed nature of the coliform impact and the distance of those areas to perennial waters, the impact would be negligible. Roads and trails would be maintained in their current condition, so they could serve as long-term sediment sources. Use is projected to increase, so impact areas could expand. Existing areas protected in part by vegetation could become part of the road and trails system. Sediment from those areas would increase. With the distance of these areas to perennial waters, the impact would be negligible. Requiring portable toilets would mitigate some of the potential fecal coliform impact. This would be a long-term negligible impact.

4.6 Vegetation

Currently in the CCNCA there are 13,461 acres of land currently not meeting land health standards, with the remainder (107,890 acres) of the land meeting standards.

In many cases the restoration/rehabilitation efforts following vegetation disturbance, whether fire or mechanical, are conducted in part to thwart weed invasions; in other cases, it is in response to weed invasion. In both, the project goal is to convert the system back to a desirable plant community. Vegetation management projects that result in the decline or disappearance of weed species would have major, long-term, positive impacts on all aspects of land health. Vegetation manipulation projects that result in plant communities more capable of competing with new weed species would have a major, long-term, positive impact. Vegetation projects that result in more weed species, or a change in some weed

species, would have a major, long-term, negative impact; hence the importance of mitigation, species selection, and the capability of the soils to sustain desirable plants.

The acquisition of land within or bordering the CCNCA would result in indirect, long-term, beneficial impacts on the vegetative environment. When considering land health, weed management and protection of riparian resources, federal ownership would offer a greater level of statutory and regulatory protection that would result in a net benefit to these resources. There could be a short-term, direct, negative impact while the conditions were improved followed by a moderate, long-term, positive impact once land health standards are achieved. The positive effect would come in terms of more efficient management of grazing, weed management, and vegetation management to strive toward the desired plant community that has been displaced with non-native vegetation. Improvement in vegetation resource areas would carry over and provide indirect beneficial impacts on soils, air and water quality, and watershed protection. Improvements to these resources would provide additional indirect benefits to wildlife habitat and special status species management.

Because noxious weed management projects and land health restoration treatments can be compromised when adjacent lands remain untreated, CCNCA lands that border private lands are given a lower priority for treatment because those areas exhibit less potential for success. As private lands are acquired, the BLM can reprioritize areas and address weed management and land restoration in a systematic, ecosystem-wide approach resulting in beneficial effects over the long term. The greatest benefit would be to weed management where rehabilitation on private lands would help eliminate encroachment of invasive species onto surrounding public lands.

Withdrawals from future mineral developments within the entire CCNCA would result in a positive impact on all vegetation resources because of the reduction of surface disturbing activities.

Minimizing sediment and salinity production and meeting water quality standards would be achieved with a healthy vegetative community and would help ensure riparian resources are protected. There would be an overall long-term, positive impact to the vegetation resource.

Maintaining or improving wildlife habitat for the 6 listed and 2 candidate species under the Endangered Species Act (ESA) and the 19 BLM Sensitive Status Species, within the CCNCA, would maintain or improve the overall health of the native plant communities within the CCNCA. Vegetation associated with target habitat improvements would be changed

but should maintain or improve long-range vegetative diversity. In all alternatives any vegetative improvement actions would have an initial, localized adverse impact but would result in improvement in the vegetative resources over time.

Livestock grazing should have a long-term positive or neutral impact to the vegetative resource under this alternative. There would continue to be areas around livestock facilities, water sources, and a few riparian areas that would have localized negative impacts from livestock grazing. The current restrictions that eliminate livestock grazing in the bottom of Mee, Knowles, and Rattlesnake Canyons are proving to be beneficial to the riparian and upland vegetation in those canyons. The vegetation resource would continue to benefit with a moderate, long-term, positive impact from ungrazed allotments.

Treatment of vegetation uplands would have a moderate, long-term, positive impact on the riparian resource, especially those lands directly adjacent to riparian areas, if treatment is successful.

Reclamation efforts would be concentrated in priority areas, including the River Corridor, Rabbit Valley, Black Ridge, and other sites of special concern. This emphasis would be a major, long-term, positive impact to land health.

This plan allows for the use of non-native plants and chemical treatment for reclamation efforts on difficult sites. This would provide for vegetative cover but may not meet rangeland health standards for a diverse native plant community. This could be considered a negative impact in the short term and positive impact in the long term as native plants reoccupy the reclaimed areas.

The current restrictions eliminate livestock grazing in the bottom of Mee, Knowles, and Rattlesnake Canyons; this alternative would give protection from grazing by restricting portions of Jones Canyon. This action is aimed at protecting riparian values and would result in minor direct and indirect benefits.

Vegetation Impacts from Recreation Management

For recreation and access purposes, Mack Ridge has a total of 51 miles of existing routes, of which approximately 35 are single- and two-track trails mostly used for non-motorized activities – hiking, biking, and horseback riding. The remaining routes are roads available to motorized and non-motorized activities. Rabbit Valley has 107 total miles of routes, of which approximately 90 are multiple-use trails and the remainder constitute dirt roads that are used for access and recreation. In the Wilderness Zone

(includes some non-wilderness portions and access roads on the Wilderness boundary), there are 112 miles of routes with about 14 miles within the Wilderness south of the Colorado River.

When planning for the placement of roads and trails, and in planning for the reclamation and stabilization of existing roads and trails, vegetation protection would be prioritized as required by BLM standard operating procedures and best management practices.

Closures of roads would have a long-term, localized minor-to-moderate positive impact on the vegetation resource. The relocation/construction of trails in Rabbit Valley and Mack Ridge could have a minor, long-term, localized negative impact on the vegetation resource. Trail construction would cause some negative, direct impacts on soil, air, and water quality. However, construction would take place incrementally and would not result in a significant impact in any one place at any point in time. Indirect impacts associated with recreational use of the newly constructed trails would also affect soil, air, and water quality. However, the trail usage would consist of displaced activity from other parts of the CCNCA, resulting in no net change in indirect impacts within the CCNCA. Limiting the construction of trails, closing some trails, and containing parking areas would have a minor, long-term, positive impact due to the decrease in surface disturbance from construction and from daily use. Closing over 10 miles of dirt roads, north of I-70 in Rabbit Valley, would have a major, long-term, positive impact to vegetation in the area and would provide indirect benefits to air and water quality, and soil resources in an already fragile area. Limiting recreation events that bring people to the CCNCA limits opportunity for dispersed use that disturbs vegetation. Any limitation on large group event would result in long-term, indirect positive impacts.

Proposed road closures include the closure of 1.5 miles of dirt road in the Mack Ridge area and 7.1 miles in the Rabbit Valley area. These closures would have a long-term, localized minor-to-moderate positive impact on the vegetation resource. The proposed construction of 16.5 miles of trail in Rabbit Valley and 6.2 miles on Mack Ridge would have minor-to-moderate, long-term, localized, negative impact on the vegetation resource. There would continue to be localized, minor, long-term, negative impact to the vegetation from existing roads and trails. Any road construction would require determination if sufficient environmental analysis of the proposals have been completed.

4.7 Forestry

Taking 12,047 acres of productive woodlands, within the CCNCA, out of the total 111,244 acres available to the public would not be a significant impact to the overall availability of fuel wood, and the field office would still

be able to meet the annual allowable harvest quantity. Some non-productive woodland acres may become productive woodland acres through time, from which woodland products may be produced. This would make up for the acres taken out of production in the CCNCA.

4.8 Wildlife, Fish, Aquatic, and Special Status Species - General

Development on private lands, especially mining or housing developments along the Colorado River, could destroy the continuity of the riparian corridor through the CCNCA by impeding riparian wildlife movement. This would constitute an indirect negative impact. Acquiring these private lands would stem the impact.

Acquiring water rights in the springs has some value in preventing unforeseen filings that could remove the springs' use as wildlife watering sites and wetland habitat. Road closures north of I-70, as seen in each alternative, would result in an overall beneficial impact on wildlife.

All proposals are designed to either promote Special Status Species (SSS) directly or indirectly through education. A potential conflict in management between SSS within the CCNCA is with the northern goshawk and Gunnison sage grouse. In grouse habitat, the proposed Gunnison sage-grouse plan would prescribe reducing the tree perches that goshawks use to hunt grouse. Elsewhere there is much mutual interest. The BLM sensitive roundtail chub and flannelmouth sucker have their welfare allied with those of the four ESA-listed Colorado River fishes. Kit foxes, burrowing owls, ferruginous hawks, leopard lizards, milk snakes, and midget-faded rattlesnakes flourish if prairie dogs thrive, complementing the needs of bald eagles and black-footed ferrets.

Wildlife inventories would gain the most information for improving the visitors' wildlife enjoyment, as well as allowing management to insert protections. Wildlife species that may be favored are antelope, due to road and trail closures, no target-shooting area; elk due to better success in perennial herb restoration; desert bighorn sheep due to expanded secure areas, better success in perennial herb restoration; and animals around campsites where wood, notably dead and down wood, is preserved.

4.8.1 Impacts from Recreation Management - Mack Ridge

Proposed recommendations on direction of travel on routes should improve the predictability of human activity for wildlife. Using gates to exclude motor vehicles would have significant, long-term, direct and indirect, beneficial impacts on all species in the area. Limiting

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motorized access would prove beneficial to all species relative to the current situation where motorized use is allowed on many trails.

Deleted: The proposal to extend the Lions Loop Road to within a quarter-mile of the river would still provide a quarter-mile buffer and would be an effective barrier to the heaviest impacts within the riparian areas of the river. Yet, some destructive incidents would occur under this alternative.

In the Mack Ridge Zone, none of the trail or road proposals or closures are in prairie dog areas. The existing Rustlers Loop Trail encircles a small colony, and the Frontage Road (Hawkeye Road) defines the upper side of small colonies located along Interstate 70 (I-70). No change to these travel routes is proposed. Thus the CCNCA RMP presents no change to the situation with prairie dogs here. Bald eagles exploit prairie dogs where human activity, if predictable, is high. Closing dead-end trails and selecting the trail routes humans want to use increases the predictability of human activities.

4.8.2 Rabbit Valley

Closure of the trails immediately north of I-70 expands the safety zone for antelope. Stopping the access points short of the river would benefit riparian wildlife habitat by providing a buffer that would discourage the most disturbing types of riverside activities. However, this proposal offers the impact of creating regular visitation to a river alluvial bottom that is now relatively undisturbed for wildlife. Allowing for designated campsites, if unacceptable damage appears imminent in Rabbit Valley, balances the risk of spreading habitat damage with the enjoyment of free campsite selection.

Not allowing target shooting in the CCNCA would remove one more potential wildlife stressor from the area. This may also help protect the prairie dog colony at the east end of Rabbit Valley, south of I-70. North of I-70, the closure of some of the two-track roads passing through prairie dog colonies would reduce shooting access to prairie dogs.

4.8.3 River Corridor

Designating campsites in the River Corridor, and along the roads south of the Wilderness, attempts to minimize dispersed campsite selection that increases the spread of riverbank damage, as well as the potential to dislodge wildlife from previously safe areas.

Tamarisk control in the Wilderness would enhance canyon treefrog habitat. The release of bio agents for controlling the non-native plant would be expected to affect the entire CCNCA population of tamarisk. A gentle reduction in tamarisk through biological control would promote the return of native plants, add greater security for

bald eagle habitat, and encourage the restoration of yellow-billed cuckoo habitat. This program would provide moderate-to-major benefits to SSS.

In the Colorado River Corridor, the proposal to continue the prohibition of camping on Chow Doggone Island would provide solitude and encourage bald eagles to nest on the island, as well as to better protect their habitat from escaped campfires.

Requiring fire pans or propane heaters for overnight use would distinctly reduce the chance of escaped wildfire destroying the cottonwood hunting perches and roosting habitat of bald eagles.

The willow habitat would also have a better chance of growing large enough to attract willow flycatchers, formerly considered the endangered race and now merely a potential sensitive species. This habitat of willow understory to cottonwood, believed to be favored by yellow-billed cuckoos, would improve chances of their returning to this section of the river. Formalizing no motorized river access would provide a margin of safety for bald eagles from misuse of firearms. .

4.8.4 South of the River

The proposed hiking and equestrian trail running north of the Jones Canyon Trailhead would increase human traffic in an area desirable for desert bighorn sheep and their solitude. Limitations in the size of groups allowed to travel in the canyons south of the river and across the Wilderness would have a negative effect on wildlife, notably desert bighorn sheep, if group size limitation results in more trips (disturbance events) being required to accommodate the demand. Requiring fire pans or fuel stoves along the southern boundary of the Wilderness would reduce potential for escaped fire. Fire, while possibly having positive benefits for desert bighorn sheep, would have an adverse impact on the scenic mixture of habitats that enhance both elk and general bird life as well as visitor enjoyment.

Within the boundaries of the Wilderness, none of the proposals contain actions that would result in significant adverse impacts on any wildlife or other species. In the Front Country, the "Gore Parcel" is a major part of the potential Gunnison sage-grouse habitat in the CCNCA. The area would be treated similarly to the Wilderness by closing it to motorized/mechanized access. This would greatly benefit the solitude that sage grouse require. The alternatives are no different in the level of recreational activity that

may occur in the sagebrush parks identified as potential sage-grouse habitat.

The other proposed Front Country spur road closures, road use designations, parking and camping options, and trailhead developments are inconsequential to the SSS. These actions would be, for the most part, distant from critical points and be small in scope. For general wildlife these measures would have long-term, indirect benefits by tending to confine disturbing activities.

Road density is becoming an increasingly popular measurement of human impact on the natural world because it is tangible, can be visualized, and is relatively easy to acquire the supporting data using current geographic information system (GIS) capabilities. Every mile of road is not equal in its effect due to variables such as road widths, location, traffic type, speed, and volume. These variabilities can be compensated for by supplementing quantitative data (road density) with qualitative knowledge of the area.

Road density is not simply an index of the effect of humans on the landscape (Forman and Hersperger 1996). Roads and road traffic are themselves the cause of, or are involved in, most of the impacts that humans make on the landscape (Hann et al. 1997, Lyon 1984). The impacts that roads have on wildlife stem from habitat fragmentation, direct habitat destruction, weed invasion access for over-hunting, adjacent habitat-altering projects, pollution, wildfires, stream sedimentation, collisions, disturbances that change wildlife movement and habitat use.

Road densities in the U.S. are usually expressed as miles of road per square mile (mi./sq. mi.). An Oregon study found that a road density of one mi./sq. mi. reduced elk use by 25 percent of what it would be with no roads (Wisdom et al. 1986). At two mi./sq. mi., roads can cut elk presence by half. At six mi./sq. mi., roads eliminated elk from an area. The Lassen National Forest (California) set habitat capability levels for five management indicator species of wildlife (Table 4-1 features three of them). Habitat capabilities are inversely related to road density; habitat capability levels increase as road densities decrease.

**Table 4-1
Habitat Capability Levels As A Function Of Road Density**

	HIGH (Road Density in mi./sq. mi)	MEDIUM (Road Density in mi./sq. mi)	LOW (Road Density in mi./sq. mi)
Bear	0.0 – 0.5	0.5 – 5.0	>5.0
Mule Deer	<2.5	2.5 – 6.0	>5.0
Pronghorn Antelope	<2.0	2.0 – 4.0	>4.0

Road density within the CCNCA incorporates all routes, regardless of type or use, in road density calculations. Paved, gravel, and dirt roads, along with bike, horse, and foot trails are all assumed to be equal. Table 4-2 displays the route density within each planning zone for the current situation and the proposed plan. The Colorado River Corridor was not included.

**Table 4-2
Route Density**

	Mack Ridge Zone Density in mi./sq. mi.	Rabbit Valley Zone Density in mi./sq. mi.	Wilderness Zone* Density in mi./sq. mi.
Existing Situation	5.6	2.7	1.3
Proposed	6.2	2.7	1.3

*Wilderness Zone includes urban interface and access routes into the Wilderness

Using the species tolerance levels discussed above, Mack Ridge is not currently suitable habitat for black bear, elk, or pronghorn and possesses a low capacity for mule deer under any option. Of these species, only mule deer are present within the Mack Ridge Zone but only in small numbers and largely confined to the River Corridor. Road density in Mack Ridge could increase by a maximum of 0.6 mi./sq. mi. Another factor that currently exists in Mack Ridge that would potentially affect big game habitat is that the zone is situated between the Colorado River and a major interstate highway. Both the river and I-70 provide barriers for migration and make the area largely unsuitable for big game. These factors together indicate that there would be no significant impact, direct or indirect, to wildlife or habitat in the Mack Ridge Zone from any of the alternatives.

Route densities in Rabbit Valley are much lower than those in Mack Ridge, therefore the overall habitat quality is higher by this

measure. The pronghorn, while not enjoying optimum conditions, should not be significantly impacted under any alternative. For a localized elk herd, proposed actions could result in long-term, indirect impact on the elk population as a result of a proposed new trail that would bisect the herd's hideout.

The Wilderness Zone's road density of 1.3 mi./sq. mi. is elevated by the roads in the Front Country and along Black Ridge. It is biogeographically similar the adjacent Colorado National Monument, which has a road density of 1.6 mi./sq. mi. The Wilderness has a higher habitat quality than the Colorado National Monument based on this road density. The Book Cliff area north of the Grand Valley up to Douglas Pass, with nearly a full complement of native wildlife, has a road density of approximately 0.7 mi./sq. mi.

An intensive biological inventory in the CCNCA, north of the Colorado River, is currently taking place. This information would be used to determine the recreation proposals' relationship to locations of rare plants and then determine if mitigation would be necessary.

4.9 Range Management

Acquiring private lands that are not currently meeting BLM Rangeland Health Standards provides an opportunity to improve rangeland conditions, which benefits grazing management. Impacts on rangeland management from additional ROWs would have minor, localized, short-term impacts. Any additional roads associated with ROWs that pass through fences may require mitigation, such as a cattle guard or gate.

Managing water resources to meet water quality standards (i.e. land health standards), minimizing sediment and salinity production, and acquiring water rights all benefit rangeland health and ensure water availability for livestock management. In the event water quality standards are not being met and livestock grazing is the causal factor, required changes could have short-term or long-term impacts on grazing management. Continued use of developed and undeveloped water sources in the CCNCA would be critical to livestock grazing management.

Continuing current wildlife management in collaboration with CDOW and U.S. Fish and Wildlife Service (USFWS) would have a positive, long-term impact on range management. Maintaining or attaining the Desired Plant Community (DPC) benefits both wildlife and livestock management. Currently there are no known conflicts between wildlife species, particularly deer, elk, antelope or desert bighorn sheep, and livestock for forage resources or habitat needs. If the trend of increased use by elk in the area south of the Colorado River continues, there could be a negative

long-term impact to vegetative conditions thus impacting land health and could result in greater competition between elk and livestock for forage resources. In most cases, vegetative treatments to improve wildlife habitat would have a positive, long-term benefit to range management.

Continuance of grazing management in accordance with current grazing regulations and policy, as well as compliance with the Standards for Rangeland Health, should have minimal impact to range management. If range management is a casual factor for areas not meeting the standards, changes would be required. These changes could have minor-to-moderate, short-term impacts to the permittee but, overall, should have a long-term, positive benefit when conditions improve. Any changes in grazing practices due to monitoring or conflicts with other uses could have short-term or long-term, negative impacts but also could result in positive long-term benefits. Impacts from restrictions on livestock use in the specified canyons and domestic sheep use should be negligible since they are already in place through agreements. If determined necessary, limiting domestic sheep use north of the river would have a moderate, long-term, negative impact to the permittee by limiting available business options. The potential of not reallocating relinquished or canceled permits could have a moderate/major, long-term, negative impact to the livestock community.

Any management practices—from implementation of grazing systems, recreation trails management, exotic and noxious weed management, and vegetation reclamation to enhancing healthy perennial plant production—would benefit grazing management. Vegetation rehabilitation projects could have short-term, negative impacts if temporary rest from grazing is required. The long-term effects of successful vegetation treatments would be positive to grazing management.

In accordance with the regulations, if areas are not meeting the Standards, current grazing management changes are to be initiated in the next grazing year. Under current management, efforts are being made to address areas not meeting the Standards, but if recreation continues to increase with less intensive management, the result could be a greater potential of range/recreation conflicts and long-term, negative impacts on vegetation and soils.

Emphasis is placed on improving plant diversity in areas dominated by cheatgrass or crested wheatgrass. Efforts may include the use of non-natives and chemical treatment, and the focus would be on improving more acres and priority areas. Overall these proposed actions would have a positive impact to rangeland management. Having the option of non-native species may provide a greater opportunity to stabilize the site in the short term, which, in turn, would benefit range management with an

overall goal of native or mostly native communities. These changes may have negative, short-term impacts on range management but, in the long term, should be beneficial.

4.9.1 Impacts from Recreation Management

Potential impacts common to all areas would come from gates left open, chasing livestock by visitors or domestic animals, and vandalism of rangeland improvements; all these would have a moderate, long-term effect. Any big recreation events should be coordinated with calving season to reduce stress to cows and calves. Requiring dogs to be on leashes in certain areas would help in reducing chasing of livestock. Careful recreational planning, especially trail placement, camping and placement of facilities away from range management facilities—especially fences, watering areas, and corrals—would minimize adverse impacts.

4.9.2 Mack Ridge Zone

Recreation from the Mack Ridge Zone would have minor impacts on range management due to the lower amount of motorized recreation, better trail placement, and lower trail density. Closing and restoring non-designated trails would have a long-term moderate positive impact to range/grazing management. New trails need to be planned for in such a way to reduce impacts on vegetation and soils, minimize livestock-recreational conflicts, and avoid certain livestock use areas such as loafing areas, ponds, or other watering sites.

4.9.3 Rabbit Valley Zone

This alternative has several potential long-term, direct, moderate, impacts on range management. The single-track trail system [in eastern Rabbit Valley providing connections to Utah trails, in the vicinity of Harley Dome,](#) would have some adverse effect on livestock grazing. There are two gates that would allow cattle to stray from the allotment resulting in a substantial amount of additional work for the permittee and potential trespass. Harley Dome is one of the few places left where wildlife and livestock can reasonably get away from fast-moving, noisy motorized vehicles that may have a tendency to increase stress levels, especially cows with calves.

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Another potential impact could be livestock following the new trails constructed, across the escarpments into a pasture they are not suppose to be in which could be a short-term moderate localized

impact. If this starts to occur, mitigation measures would need to be in place for additional drift fences and recreation cattle guards. If beginnings or endings of motorcycle/all-terrain vehicle (ATV) trails are on or around stock ponds or reservoirs, the potential of using the dam face as a recreation play area could result in erosion of the dam face, resulting in a short-term, minor, negative effect. Most other impacts would be similar to Mack Ridge although the higher concentration of use and dispersed camping increases the potential of impacts on the vegetation and soils as well as livestock-recreationist conflicts.

These proposals could result in several potential long-term, direct, moderate impacts on range management.

4.9.4 River Corridor Zone

Impacts on range management should be minor within the River Corridor Zone. Livestock does not use most areas along the river. In those areas the potential exists for livestock-recreationist conflicts, especially if campsite density increases in these areas. Encouraging limited group size in the canyons would have no impact since livestock do not use these areas. Not designating camping sites would have a minor, negative effect by increasing the possibility of recreationist-livestock conflicts, as well as having a greater impact on vegetative resources discussed in the vegetation section.

4.9.5 Wilderness Zone

Recreation within the Wilderness Zone would have minor, short-term, negative impacts on range management. The potential for impacts would increase as visitor use increases. Allowing dispersed camping has the potential of increasing impacts on vegetation and soils as well as increasing the probability of user/livestock conflicts.

Limiting the size of groups within the canyons would not impact range management. Encouraging limited group size within the Wilderness Zone would be a positive impact by reducing impacts on resources and reducing probability of user-livestock conflict. Educational material regarding private land issues would be a positive, long-term impact to range management and the private landowner.

4.10 Cultural Resources

Regardless of which alternative ultimately is selected, management measures are in place that preserve and protect cultural resources for present and future generations (FLPMA Sec. 103 [c], 201 [a], 202[c]; National Historic Preservation Act [NHPA] Sec. 106, Sec. 110[a]; ARPA Sec. 14[a]). Compliance with management measures for authorized actions requires consultation with the Colorado State Historic Preservation Officer, federally recognized Native American tribes and other members of the interested public, the identification and evaluation of cultural resources, and adherence to procedures for resolution of adverse effects and mitigation of impacts. Preservation in place through avoidance is the most commonly applied mitigation measure. However, this mitigation strategy requires long-term, systematic monitoring of cultural resources allocated to scientific use, conservation for future use, traditional use, and public use. Excavation or data recovery, in those cases where avoidance is not feasible, is also an acceptable form of mitigation if conducted under an approved research design.

As noted earlier, only 7 percent of the CCNCA has been professionally inventoried, resulting in the recordation of 349 sites and 144 isolated finds. The cultural resource overview for the CCNCA (Hauck 2003) found that the known resource data provide an inadequate base for projecting anticipated site densities for planning purposes. The impact analysis focuses on the extent of change associated with the alternatives and their potential to modify the risk of impacts on cultural resources. Because the known resource data are incomplete, the assumption is that there are protected resources throughout the planning area.

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The cultural resources of the CCNCA have already been subjected to significant adverse impact through erosion, grazing, off-highway vehicle (OHV) traffic, bike traffic, foot traffic, unauthorized surface collection of artifacts, unauthorized excavation of archaeological sites, and intentional vandalism. Fifteen percent of the recorded sites are currently subject to erosion or major vandalism. These require immediate attention in order to prevent the loss of significant information. Forty-two percent have been subject to minor vandalism. These will be scheduled for re-evaluation and an assessment of current condition. Nineteen of the vandalized sites are rock art panels.

There will be negligible direct and indirect impacts from geology, water management, climate and air quality management, noise levels, weed management, paleontology, socio-economics, and law enforcement

Acquiring nonfederal lands would afford more statutory and regulatory

protection to any cultural resources on the transferred lands and could enhance protection of currently managed resources by consolidating holdings. Withdrawing land from development would preclude potential impacts on any cultural resources. Hence, there will be a long-term beneficial effect. Disposing of federal lands would permanently remove federal protections afforded to cultural resources and would require completion of Section 106 of NHPA. Current Colorado BLM policy does not allow for National Register of Historic Places-eligible properties to be transferred to private lands under a deed patent reservation.

Granting ROWs on federal land has both direct and indirect impacts on cultural resources and would require completion of Section 106 of NHPA.

Transportation management could result in both direct and indirect impacts on cultural resources and would require completion of Section 106 of the National Historic Preservation Act (NHPA). Increased accessibility to resources could lead to vandalism and unauthorized collection of cultural resources. It could facilitate cultural use of traditional locations by Native Americans.

Erosion protection measures can affect cultural resources through direct surface disturbance and would require completion of Section 106 of NHPA. An emphasis on land health enhancement and expansion of ongoing erosion protection measures help the long-term preservation of archaeological sites.

Vegetation treatments in and around riparian areas and springs can affect cultural resources through direct surface disturbance and would require completion of Section 106 of NHPA.

Restoration treatments can affect cultural resources through direct surface disturbance and would require completion of Section 106 of NHPA.

Woodcutting and fuel treatments can affect cultural resources through direct surface disturbance and would require completion of Section 106 of NHPA. Forestry management practices can decrease erosion and, therefore, preserve archaeological sites.

Wildlife and fish structural improvements (e.g. ponds, fences) can affect cultural resources through direct surface disturbance and would require completion of Section 106 of NHPA.

Livestock improvements can affect cultural resources through direct surface disturbance and would require completion of Section 106 of NHPA. Grazing has a direct impact on cultural resources through trampling, toppling of standing architecture, disturbance of subsurface

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cultural deposits, and causing artifact breakage (Osborn et al. 1987). Grazing may have secondary impacts due to increased localized erosion and subsequent destruction of intact archaeological deposits in open campsites. Grazing can affect cultural resources through direct surface disturbance in areas of livestock concentration and would require completion of Section 106 of NHPA. Rangeland management actions could reduce the potential impact of erosion and trampling on cultural resources. The restriction of livestock grazing in Mee, Knowles, and Rattlesnake Canyons will be of long-term benefit to the cultural resources of those tributary canyons.

Management measures in compliance with the NHPA and the BLM National Programmatic Agreement provide a systematic means to address impacts on cultural resources from authorized projects and activities. However, inventories of cultural resources are generally deferred until a specific undertaking is defined in response to development projects, sometimes limiting management options. Mitigation through excavation of archaeological sites and/or documentation would recover information pertinent to current research concerns but could also destroy the resource, thus precluding future research opportunities. Impacts on known or unknown cultural resources resulting from unauthorized activities, such as illegal grazing, off-trail OHV use, and vandalism, can go unnoticed and will not likely be mitigated.

Increased visitation and recreational use of the CCNCA constitutes the greatest threat to cultural resources contained in the current plan alternatives. OHV use could affect cultural resources through direct disturbance, soil compaction, altered surface water drainage, and erosion. Designating limited areas and closing areas for OHV use could have a major impact on cultural resources in areas where OHV activities are still permitted by concentrating potential effects of this activity. Concurrently, route designation would protect cultural resources being impacted off of travel routes. Road and trail designation requires compliance with Section 106 of NHPA. The indirect impacts of increased access and visitation (i.e., surface collection, foot traffic, vandalism, etc.) may be more harmful than the direct effects of trail and road building. As noted above, the cultural resources of the CCNCA already have suffered serious degradation from surface collection and vandalism. Some of the effects of increased visitation may be mitigated through educational interpretive programs.

The McDonald Creek Cultural Area is being monitored for possible future reclassification as an area for public use being placed in conservation for future use. The management goal is to study, rehabilitate and protect the rock art for long-term preservation.

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Visual resource management decisions could have a direct and indirect impact on significant cultural landscapes and would require completion of Section 106 of NHPA.

The management goals and prescriptions for some Special Management Areas (SMA), e.g. recreation, could have a direct and indirect impact on cultural resources and would require completion of Section 106 of NHPA.

Wildland fires could have a direct and indirect impact on cultural resources and would require completion of Section 106 of NHPA. Although the protection of cultural resources are addressed by fire management plans, suppression activities, such as allowing OHV use, cutting bulldozer lines, and constructing fire camps, can directly damage resources and cause sediment compaction and erosion.

Hazmat clean up operations could have a direct and indirect impact on cultural resources and would require completion of Section 106 of NHPA. These operations can involve surface-disturbing actions.

Cumulative Impacts on Cultural Resources

Other regional resource, land use, and economic development planning efforts can affect the types and intensity of uses within the planning area and can affect the regional resource base. For actions that could affect cultural resources on federal land, or actions that are funded, licensed, or permitted by the federal government, compliance is required with the NHPA and other laws, statutes, and regulations. The effects of activities on protected cultural resources would have to be considered and any adverse effects would have to be resolved. State agency actions using federal funds or needing a federal permit require cultural resource review. State agencies must also consult with the Colorado Historical Society when their activities involve nominated or listed State Register properties.

Impacts on resources would be avoided or otherwise mitigated in many of the regional actions.

Developing lands that are not protected by federal or state cultural resource statutes and regulatory protections could decrease the regional resources base or lead to loss of Native American resources, affecting the understanding of these resources and potentially limiting management options within the planning area. Restrictions on recreational activities in other areas, population growth, resource extraction, and development can increase the use intensity within the planning area, potentially affecting cultural resources. Coordinating with these regional planning actions could protect resource values.

Management measures are in place to identify and mitigate impacts from authorized projects and activities. Mitigation of impacts could preclude other desirable management options and future uses. Impacts on known or unknown cultural resources have cumulative impacts through incremental degradation of the resource base from a variety of sources reducing scientific information and interpretative potential or affecting values important to the Native American communities. Measures are in place to identify threats to resources and to prioritize management actions; nevertheless, some impacts are unavoidable. Continuation of current management practices in the planning area is not expected to cause cumulative impacts when combined with past, present, and future actions in the region.

Resources will be managed according to existing legislation and BLM policies, which include measures to identify and protect cultural resources in planning and project activities. Class III inventories in compliance with Section 106 of the NHPA will be conducted prior to all surface-disturbing activities, and mitigation measures will be taken to avoid or reduce impacts on resources. There would be potential impacts associated with development projects and vegetative treatment projects that will be mitigated under current management measures. There would continue to be impacts on NRHP-eligible sites, unevaluated and undiscovered cultural resources associated with unregulated OHV use, illegal grazing, and vandalism. The rate of these impacts will increase in concert with the local human population. Current management actions that designate limited and closed areas for OHV use will enhance the protection of cultural resources, as will measures that control erosion or withdraw lands from development uses. No unmitigated impacts on cultural resources are anticipated under current management practices for authorized activities, although unauthorized activities and natural processes may well have negative effects.

The restriction of livestock grazing in Mee, Knowles, Jones, and Rattlesnake Canyons will be of long-term benefit to the protection of cultural resources of those tributary canyons.

4.11 Paleontological Resources

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Impacts on paleontological resources from other paleontological resource management actions are possible and may be affected regarding areas opened for collection, interpretation, land exchange, and other management actions. Increased access and other such actions could have an effect on erosion and other degradation, including theft and vandalism of fossils.

Paleontological resources under all alternatives would be managed according to existing laws, regulations, and other authorities under the guidance of the BLM 8270 Manual and Handbook for the Management of Paleontological Resources, and pertaining scientific collections handled as per DM411 for the Management of Museum Properties.

Publications, unpublished reports and records, maps, and other sources have led to information on over 120 known paleontological localities within the CCNCA. It is important to continue updating this information into a database incorporating new finds, as less than 10 percent of the CCNCA has been field surveyed for fossils. Important rock units likely to yield scientifically important fossils have been mapped for the CCNCA, and this includes mostly the Upper Jurassic Morrison Formation. Internationally important dinosaur, mammal, flower, and other fossils have been found in the CCNCA, so it is imperative that these resources continue to be identified, studied, and protected.

The paleontological resources of the CCNCA have been subject to erosion and impacts due to expansion of populated areas. Continual vandalism and theft are an ongoing problem at many localities. Continued proper management, public education and outreach efforts, support of scientific and educational research, and other appropriate uses for these paleontological resources are needed.

Continuing current management practices would not change levels of ongoing impacts on paleontological resources. These resources would continue to be managed under existing laws, regulations, and related guidance as outlined in the BLM 8270 Manual and Handbook for the Management of Paleontological Resources. Pertaining scientific collections would be handled as per DM 411 for the Management of Museum Properties.

Areas of Condition 1 and, in some cases, Condition 2 geologic units or areas would be assessed to see if a paleontological resources survey needs to be conducted, along with any pertinent mitigation, prior to any proposed ground-disturbing actions. These needs would be addressed through the CCNCA office in consultation with the Grand Junction Field Office (GJFO) Paleontological Coordinator and the BLM Regional Paleontologist.

Reports of vandalism, theft, and degradation of paleontological resources would continue to be handled through coordination with Law Enforcement, FO managers and staff, and in coordination with the GJFO Paleontological Coordinator and the BLM Regional Paleontologist.

Land acquisitions, exchanges, or sales could have an impact on paleontological resources. Acquiring lands with such could be beneficial for protecting fossils if they can in turn then be protected from other potential resource use conflicts. Exchange or sale of certain parcels would need to be assessed for possible damage or loss of paleontological resources.

Added access to certain areas increases the possibility of discovery of fossils but also may cause increased vandalism and theft to paleontological resources. Also, if fossils are found in a developed ROW, certain reclamation efforts may cause impacts on these resources by obscuring them from view and allowing slow underground decrepitation or degradation to fossils.

Changes in water levels in some areas may impact paleontological resources. Any proposed ground-disturbing actions along streams or standing water should be assessed for possible impacts on track fossils, trace fossils, buried Pleistocene deposits, and any other related fossils.

There are usually negligible effects on paleontological resources caused by wildlife, fish, and aquatic life and grazing. There is some trampling around ponds, springs, and other water sources, and some natural acidification or decrepitation caused to fossils by nearby and decaying organic matter.

There may be some impacts on paleontological resources from vegetation projects if they involve recontouring, infilling, and soil development, and reseeding may have an effect if paleontological resources are involved. Such actions may cause degradation and obscuring of fossils through soil build up and root establishment. This may in some cases also help preserve fossils but can also remove scientifically important fossils from being collected, or common invertebrate and plant fossils from being recreationally collected in reasonable quantities.

4.11.1 Impacts from Recreation Management

If not carefully managed for, recreation management could possibly have one of the largest series of impacts on paleontological resources. Fossils tend to be found in remote areas, and when public use and access is encouraged to remote sloped areas, there is a higher likelihood of inadvertent or knowledgeable impacts on paleontological resources. Roads, trails, and other areas where the public are encouraged to congregate may often be near sensitive paleontological localities vulnerable to theft and vandalism. For this reason, management should take into account the survey for and proximity of known or

suspected paleontological resources when planning for increased recreational uses of an area. Using the standard procedures for activity-level analysis prior to irretrievable commitment of resources would minimize impacts from recreation actions to the level of insignificant.

4.12 Socioeconomic and Environmental Justice

4.12.1 Socioeconomic Impacts - Outdoor Recreation

Under all alternatives, one of the primary factors influencing visitor use in the CCNCA will be local and state population growth. Table 4-3 shows projected population levels for Colorado, Mesa County, Grand Junction and Fruita out to the year 2020. The figures for Colorado and Mesa County are from the Colorado Demography Office. Those for Grand Junction and Fruita were derived by increasing current population estimates at the same rate as the county's growth rate. Fruita has actually grown more rapidly than the county in recent years and, for that reason, the estimates in the table could be low.

Population growth in the Grand Valley will bring about increased recreation use in the CCNCA because of its proximity. Growth outside Mesa County may have an even greater impact on use as the CCNCA becomes more well-known. The CCNCA already has substantial non-local use, and the non-local share of use could increase. Population growth in Fruita will of course be a factor in expanded recreation use in the CCNCA. In turn, increased recreation use in the CCNCA could influence Fruita's growth as local jobs will be created in response to expanded visitation to the CCNCA.

Table 4-3: Projected Population, Mesa County, Grand Junction, Fruita, 2000-2025.						
	2000	2005	2010	2015	2020	Change 2000- 2020
Colorado *	4,335,540	4,691,258	5,137,928	5,632,645	6,133,491	1,797,951
Mesa County *	117,656	129,390	143,591	161,310	181,367	63,711
Grand Junction	32,893	36,173	40,144	45,097	50,705	17,812
Fruita	6,478	7,124	7,906	8,882	9,986	3,508

* Colorado Demography Office, Department of Local Affairs (May 2004)

Although population increase would, in the long-term, be a major determinant of growth in visitor use, that use could increase faster than the population for periods of several years, if not 15 to 20 years. This appears to be happening right now. The CCNCA is a relatively new area and its reputation is just being made. As word of the area's diversity and richness spreads, recreationists who might have gone elsewhere, like Moab, instead may opt to discover the experiences available in the CCNCA. In economic terms, its "market share" will grow.

4.12.1.1 Alternative 1, No Action

Table 4-4 below displays the levels of recreation use in the CCNCA and the economic impact that would be expected, assuming use were to increase through the year 2020 at a somewhat greater rate than population growth - a 2.5 percent growth rate as opposed to 2.2 percent. This somewhat higher rate reflects the increased "market share" the CCNCA is likely to acquire in years to come. The figures in the table represent the impact of pursuing a management strategy that would make few changes in the day-to-day operation and use of the CCNCA, the No Action alternative. This level of use and related impacts are the baseline against which the other alternatives would be measured.

The calculations assume that the percentage of non-local use would remain unchanged. However, if non-local use were to grow at a faster rate than local use, the economic impact would be greater than that displayed on the table since a relatively larger share of the CCNCA's visitors would be bringing outside money into the local economy.

The calculations of expenditures and their direct and indirect impact are based on a 2003 evaluation of CCNCA recreation expenditures by the U.S. Geological Survey which is available in draft form (USGS, 2004)

The estimated 332,851 visitors in 2020 would be 52 percent more than the number of recreationists who visited the CCNCA in 2003 (see Table 3-28). The number of non-local users is projected to be 81 percent higher, growing to 211,683. As is currently the case, the Kokopelli Loops and Rabbit Valley would have the most use. Almost \$15 million in annual expenditures (2003 dollars) would support 383 jobs and over \$8 million in local income. These amounts would remain relatively small components of the Grand Valley economy (less than one percent) because the economy would continue to grow at or near the same rate as CCNCA visitor use. However, the economic impact on the area in the immediate vicinity of the CCNCA, that is to say, in Fruita and western Mesa County, is likely to be stronger than it is currently. The number of Fruita-area businesses that are tied to recreation activity in the CCNCA would likely have increased by 2020. Thus expenditures by non-locals for gasoline, lodging, meals and equipment would more likely be spent in the Fruita area.

Table 4-4: Estimated Economic Impact of Recreation Use in the CCNCA in 2020, Current Management Growth Scenario

	Kokopelli Loops	Colorado River	Rabbit Valley	Other Trailheads	Total
Annual Use Total	173,176	49,028	81,366	29,280	332,851
Non-local	121,223	34,320	48,820	7,320	211,683
Annual Expenditures	\$10,354,898	\$1,215,605	\$2,779,792	\$416,804	\$14,767,099
Direct Effect Income	\$3,184,840	\$317,847	\$721,273	\$108,148	\$4,332,108
Jobs	189	17	40	6	252
Indirect Effect Income	\$2,831,360	\$285,370	\$645,022	\$96,715	\$3,858,467
Jobs	97	9	22	3	131
Total Effect Income	\$6,016,200	\$603,217	\$1,366,296	\$204,863	\$8,190,575
Jobs	286	27	61	9	383

As is currently the case, the amount of job and income growth generated by the CCNCA understates the socioeconomic importance of the CCNCA. The recreation resources of the CCNCA will continue into the future to be part of a matrix of public land resources that are important elements of the quality of life in the Grand Valley. The public lands in the area represent a wealth of recreation opportunities and a reservoir of open space and scenic qualities that residents value highly.

4.12.1.2 Alternative 2, Emphasis on Recreation

Under this alternative, BLM management of the CCNCA would expand the number of recreation opportunities and recreation support facilities in order to maximize the recreation utility of the CCNCA while still conserving natural resources and protecting traditional uses. The number of trails would be increased, parking lots would be paved, more restrooms would be installed and the permit system would be more liberal, with larger groups and more group events permitted. The change in use brought about by this management emphasis cannot be reliably predicted, but it is very likely to be greater than would be expected in the No Action alternative. Assuming that under this alternative, recreation use in the year 2020 was twenty percent greater than in the No Action alternative, then almost 400,000 visits would be expected, about 254,000 who are non-residents. About 460 jobs and just under \$10 million in local income would be supported by such use levels.

4.12.1.3 Alternative 3, Adaptive Management

Under this alternative, BLM management would attempt to maintain the recreation experience that is currently available. In some areas, trails would be closed, in others they would be opened or expanded. Facilities would probably remain somewhat limited in scope. The permit system would remain much as it is currently with the possibility that it could be made more restrictive at some time in the future. In all likelihood, adaptive management would tend to restrict the growth of recreation use in parts of the CCNCA while allowing it to grow without restriction in others. Because any restrictions at all would reduce use, the overall level of use under this alternative would be less than the No Action alternative. There would also be a somewhat different mix of

uses between commercial and private, between motorized/mechanized and foot traffic, and between different areas within the CCNCA than under the No Action alternative. Assuming use levels were ten percent less than Alternative 1, about 300,000 visits would be expected, perhaps 190,000 of them by non-residents. About 345 jobs and over \$7 million in local income would be supported by recreation use in the CCNCA.

4.12.1.4 Alternative 4, Emphasis on Conservation

Under this alternative, conservation of natural resources would be maximized while traditional uses and recreational opportunities would be maintained to the extent possible. No new trails would be opened, some would be closed, support facilities would not be expanded and the permit system would be restrictive. With the recreation management provided by this alternative, visitation would probably be lower in the year 2020 than under the No Action alternative. If recreation use were twenty percent less than the baseline use, then about 266,000 visits would be expected, of which perhaps 170,000 would be by non-locals. While lower than that of the other alternatives, it would still be about twenty percent above current use (45 percent more for non-local use). Over 300 jobs and about \$6.5 million in income would be supported by such visitation.

4.12.2 Lands and Rights-of-Way

Under all alternatives, BLM would continue to acquire private inholdings from willing sellers and would manage rights-of-way to honor existing commitments and to protect the overall landscape character, supporting the wilderness and recreation values for which the plan was developed. Private lands within the CCNCA amounting to 1,865 acres could potentially be acquired by BLM. Since the land acquisitions and other proposed actions are generally supportive of the central aspects of the plan, they can be construed to participate in the overall socioeconomic impacts of the plan.

The impact of the CCNCA resource management plan on private land values is impossible to assess with the information available. The actual determination of socioeconomic impacts could only be made on a case-by-case basis since each tract of land has different properties and potentials and the conditions of any future land sales would depend greatly on circumstances at the time of sale.

4.12.3 Minerals

The entire CCNCA is withdrawn from operation of federal mineral laws governing development of oil and gas, development of coal, location of hard-rock minerals and sale of mineral materials. This action should have no discernible socioeconomic impact since the area has no history of mineral development and has been determined to be of low potential for coal, oil and gas, locatable minerals and mineral materials.

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4.12.4 Forestry

Alternative 1 would allow continued cutting of fuelwood and fence posts in the Black Ridge area; the other alternatives would discontinue this practice. Neither option would produce a socioeconomic impact because the activity is subeconomic in Mesa County and because there is a ready supply of alternative sources that would allow BLM to meet its allowable-cut targets. Those individuals who have in the past cut fuelwood in the CCNCA would have other sources.

4.12.5 Rangeland Management

Under all alternatives, the socioeconomic impact of rangeland management would be essentially the same. The principal economic factor in public land grazing is the amount of forage available to livestock operators. Under all alternatives, the grazing allotments that are all or partially within the CCNCA would continue to represent 16,479 Animal Unit Months (AUMS) of available forage, as they do now. This amounts to about one percent of the total AUMs from public lands, including National Forest Lands, in Mesa County. The income supported by this forage is a very small part of an industry that has itself become a small part of the local economy. The grazing allotment permits are held by eight operators and neither the number nor the ownership of any of the permits would be changed by any of the alternatives.

Although the amount of AUMs remains the same, some variation in the details of grazing management is called for by the different alternatives. Under Alternative 4, construction of additional range improvements would not be permitted; Alternatives 3 and 4 would have somewhat more restrictions on grazing in the tributary canyons south of the Colorado River; Alternative 4 would not allow sheep grazing at all south of the Colorado River. These changes, however, affect only the amount of BLM and permittee flexibility in

managing the rangeland resource and not the amount of forage available. Although individual permittees might be affected to some degree, there would be no measurable economic impact. The one alternative recommendation that could have an economic effect in the long-run would be the provision of Alternative 4 that grazing permits relinquished or cancelled would not be reallocated. Over time, this could mean a reduction in the available forage. The economic impact of this would be very low, however, since the forage in the CCNCA represents a small part of a small economic sector.

4.12.6 Environmental Justice

The socioeconomic impacts of CCNCA management are not large relative to the basic social and economic resources of Mesa County. Additionally, the minority and low-income populations of the county are small relative to state-wide averages and such populations are dispersed throughout the county. Therefore, no minority or low-income populations would suffer disproportionately high and adverse effects as a result of any of the alternatives.

4.13 Recreation Management

4.13.1 Lands , Rights-of-Way, Withdrawals, Water, Forestry

The acquisition of private inholdings within the CCNCA, as well as along the boundaries, is a benefit for recreation management. Several proposed actions rely on gaining ownership of key inholdings, such as the development of a formal campground and the designation of some key trail segments. Acquisition of other inholdings would allow consideration of additional favorable actions such as improved management at the Loma Boat Launch, additional camping opportunities along the river, or additional trail opportunities.

The level of direct impacts from acquisitions would depend on the properties acquired but, in general, would be considered moderate and long-term beneficial. Indirect impacts could arise from surface-disturbing activity and increased use. Surface disturbing activity from trail or facility construction, vegetation management projects, or rangeland improvements would occur incrementally; and short-term, adverse impacts on air and soil would be minor, adverse impacts on these resources.

Ground disturbance would be detrimental to the visual and aesthetic quality of recreation experiences and would be a minor-

to-moderate, localized impact, depending on the magnitude of the ROW. A restrictive policy on only granting ROWs to access private inholdings, and including stipulations such as burying phone and power lines, would alleviate most of the potential impacts.

The withdrawal of the CCNCA from mineral development is a long-term, moderate, positive impact to recreation due to the avoidance of new disturbance and the presence of activities not compatible with the resource settings.

Mitigating actions to protect water resources is positive because it maintains the physical resource setting and tends to enhance recreation experiences.

Other proposed actions such as acquiring water rights, exceeding water quality standards, controlling sediment and salinity, and other water protection and enhancement measures, all work toward an improved natural environment, resulting in an improved physical setting. This would be a long-term, moderate, beneficial impact.

The cutting of trees for fuel or fence posts could detract from the natural setting in an area where visitors desire to maintain the existing character. This would be a minor-to-moderate impact depending on the harvest level.

Identifying important geologic features could offer some quality interpretive recreation opportunities. This would provide positive long-term, minor-to-moderate impacts.

4.13.2 Wildlife, Fish and Aquatic

Enhancing the Watchable Wildlife Program in Rabbit Valley would also enhance the interpretative program for the area. It would add to recreation activities such as wildlife viewing, nature study, and photography. This would offer positive, long-term, minor-to-moderate benefits.

The impacts of meeting obligations to the Endangered Species Act and protecting BLM sensitive species would be elevated, because of the extra emphasis placed on monitoring the compatibility of recreation and sensitive status species. Impacts could be moderate-to-major and intermediate-to-long term.

4.13.4 Range

Re-evaluation of relinquished or canceled grazing permits for future allocation could result in benefits to recreation if the decision resulted in not re-allocating the permit. This could result in fewer fences and other grazing facilities, which would enhance the physical and social settings for visitors, especially in the Wilderness. The beneficial impact would be long term with the level of impact depending on the magnitude of the change.

Utilizing additional range improvements to improve grazing management generally means additional fencing and other non-natural facilities or developments. These additions detract from natural settings, which lessens recreation experiences and benefits, particularly in settings where naturalness is highly valued. The impact would be minor-to-moderate depending on the location and level of development.

Adding portions of Jones Canyon and considering additional canyon locations to the areas where grazing is not authorized, in order to protect riparian resources, would enhance the recreation setting in these Wilderness locations. This would provide a minor-to-moderate impact to the recreation setting through improved visual and aesthetic quality.

4.13.5 Vegetation

Policy and actions proposed aggressively pursue improving land health. A healthy environment enhances the setting for visitors, elevating the chance to meet experience and benefit expectations. At the level of implementation planned, the impacts would be positive and have a moderate effect on recreation. Over time, the cumulative impact would be moderate-to-major, depending on the success of the proposed land health program.

4.13.5.1 Noxious Weeds

The actions proposed to manage and eradicate noxious weeds would create a positive impact for recreation by improving the natural setting. Impacts would be minor and local in the short term but would be moderate over time. Along the River Corridor, there would be a major long-term impact as tamarisk, Russian knapweed, and purple loosestrife currently make some areas unusable or even inaccessible.

4.13.6 Cultural Resources

The identification of more cultural sites limits recreation opportunities if mitigation is necessary for cultural resource protection. Alternate locations for facilities and/or opportunities may lessen the ability to realize the desired experiences and benefits. In some cases the mitigation could be to cancel the proposed action.

The viewing of cultural resources is a desirable recreational opportunity for the public. Developing interpretive opportunities in the field would moderately enhance a desired activity.

4.13.7 Paleontological Resources

Recreational collecting would not be allowed in the CCNCA. This would be a negative, moderate impact to recreational collectors because, while there are other sites for their hobby, the CCNCA is one of the best locations in Mesa County.

The impact to non-collectors would be minor-to-moderate, depending on preferred opportunities, as the natural setting would be preserved. Activities, such as nature study, guided interpretive tours, and fossil viewing, would derive the greatest benefit.

4.13.8 Recreation Management by Zone

4.13.8.1 Mack Ridge Zone

Designating the trails network locality as day use only would have a long-term minor impact on non-local river users and trails enthusiasts that need an overnight place to stay. This may be mitigated if an adjacent area suitable for a primitive campground can be located.

An increase of 6.2 miles of trail is proposed. The major trail users for this area would have additional trails to use and less traffic from commercial and motorized uses. This would provide long-term, moderate benefits for non-motorized trails enthusiasts. The adverse impacts on recreational motorized use and commercial use would be elevated because the additional restrictions begin to include roads that have some motorized use, and commercial use maximum limits would be around the current level. These impacts would still be minor.

4.13.8.2 Rabbit Valley Zone

If the BLM is able to acquire the Joufflas inholding, a formal campground would be developed. This would be a positive, long-term, moderate impact as it provides a desired recreation opportunity that is consistent with the Rabbit Valley setting and is not offered anywhere in the CCNCA.

4.13.8.3 Trails Proposals

Approximately 6.5 miles of multiple-use trail segments are rerouted to locations that are more stable, more aesthetic, less prone to trail braiding, and offer an enhanced trail experience. The impacts would be a moderate, long-term improvement.

The inclusion of 11.1 miles of new motorized trail proposals enhances the opportunities for motorcycles and ATVs. Motorcycling was shown to be the most desired activity in the Rabbit Valley Zone (NAU Visitor Survey – 2002). The impact would be moderate and long term.

For non-motorized trail users, there would be a long-term, minor-to-moderate, unfavorable impact. Even though the trails are designated as multiple use, heavy motorized use tends to cause other trail users to pursue opportunities at other locations in order to realize desired experiences and benefits.

Hardening surfaces at areas of visitor concentration; such as parking areas, trailheads, and group campsites; would reduce dust intrusion, rough surface conditions, and would be resistant to impacts from storm events. The hardening would be done by means other than paving, so the surface could be designed to blend with the natural environment and avoid impacting the Recreation Opportunity Spectrum (ROS) settings within Rabbit Valley.

Designating dispersed camping sites, south of the Wilderness boundary along the BS Road, limits the camping opportunities and would be a minor, long-term impact for campers. The benefit is the reduction of disturbance to the natural environment and the conservation of the desired recreational setting.

Working cooperatively with the adjacent landowners in the Front Country vicinity, including the City of Fruita, Colorado National Monument, and the growing urban-interface

community, would allow for consistency in management and an improved level of planning decisions. This would be a positive, long-term moderate-to-major impact.

There are several proposed actions to relocate, or improve, trailheads and add, or improve, parking areas. Individually, these actions are all minor impacts. Collectively, these actions would enhance opportunities, prevent degradation to the resources, and maintain the desired setting for the south end of the Wilderness Zone. The result would be a long-term moderate benefit.

4.14 Cumulative Impacts

Cumulative effects are impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

Other regional resource, land-use, and economic development planning efforts can recommend actions that singly may have no impact, adverse or beneficial, but, when taken together with actions from other reasonably foreseeable future actions, could result in a cumulative impact.

Many agencies in the Grand Valley have recently undertaken, or completed, planning efforts. Agencies with land-use or resource management planning efforts in the local area include:

Mesa County

- Mesa County Master Plan
- Fruita/Mesa County Greenway Business Park Plan
- Loma/Mack Rural Communities Plan
- Redlands Plan

Fruita

- Fruita Community Plan 2020
- Highway 340 Corridor Plan
- Redlands Area Transportation Study
- Fruita/Mesa County Greenway Business Park Plan

Grand Junction

- City of Grand Junction Strategic Plan 2002-2012
- The Grand Valley Community Vision for the Year 2020

National Park Service

-Colorado National Monument General Management Plan

United States Forest Service

- Grand Mesa Travel Plan
- Grand Mesa, Uncompahgre, Gunnison Land and Resource Management Plan

BLM

- Billings Canyon Environmental Assessment
- Bangs Canyon Recreation Area Management Plan
- North Fruita Desert Recreation Area Management Plan
- Gunnison Gorge National Conservation Area Resource Management Plan And Environmental Impact Statement (Uncompahgre Field Office – Montrose)
- Roan Plateau Resource Management Plan – Glenwood Springs Field Office

On a regional scale, the local planning area is considered to be Mesa County and includes the Colorado National Monument; Grand Mesa National Forest; and the cities of Grand Junction, Fruita, Palisade, Loma, and Mack. Throughout the planning process these agencies and municipalities have been involved in helping the BLM develop a vision for the management of the CCNCA. The goals and objectives of the plans listed above, for each of these agencies, are consistent with the goals and objectives of the CCNCA RMP; to preserve the unique resources of the area and to protect the amenities that the area offers its local population as well as those uses drawing visitors worldwide.

Both the Colorado National Monument and the City of Fruita are engaged in planning efforts and have worked closely with the CCNCA management and planning staff to ensure that common goals are addressed in all plans. Linked trails and cooperative management of neighboring locations are examples of how actions can be implemented to minimize surface disturbance and resource impacts from redundant trail systems.

The BLM GJFO is comprised of 1.2 million acres of public lands. Multiple-use activities that occur in the local area include OHV recreation, mountain biking, hiking, camping, wildlife viewing, oil and gas development, and cultural and paleontological resource management. The GJFO is currently in the process of developing plans for two recreation areas – Bangs Canyon and the North Fruita Desert. All areas are designed for multiple-use, and the plans would identify appropriate recreational uses on various trails and aim toward minimization of user conflicts. All management

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plans are moving toward designation of roads and trails to minimize the adverse impacts associated with cross-country use.

Resource areas that have some potential for adverse cumulative impacts would include soils, air and water quality, and cultural and paleontological resources. For these resource areas, management measures, including standard operating procedures, standard design practices, and best management practices, have been developed to identify and mitigate impacts resulting from authorized activities.

Geology, topography, noise, and climate would not be adversely impacted by any action within this RMP, or any other action foreseeable in the planning area.

The acquisition of private inholdings from willing sellers is an action found in all alternatives. The acquisition of every inholding in the CCNCA would have an extremely beneficial long-term affect as a result of the regulatory and statutory protection that would then be afforded these lands. This would be especially true in areas of cultural and paleontological resource protection, weed management, vegetation restoration, and riparian and watershed protection. However, acquisition of private lands would initially have a direct negative impact until resource management projects can be funded and initiated within these areas.

CCNCA management objectives could result in additional restrictions on right-of-way proposals.

Any recreation activity allowed on these lands would have the potential to offset long-term gains with short-term impacts from trail or facility construction. The proposed RMP and the other management alternatives developed for this RMP have taken into account future uses of private lands, if they can be acquired from willing sellers; and cumulative impacts, both direct and indirect, resulting from land acquisition, would not be significant.

Cumulative impacts on soil, water, and air from BLM actions, and actions from any other reasonably foreseeable action, would be mitigated by local, state, federal, and agency regulations that exist. None of the actions discussed across the region have the potential to cause significant adverse impact to the quality of the air, water, or soil, and the addition of the actions discussed within the alternatives developed in this RMP would have no additive effect. Using monitoring and setting Limits of Acceptable Change (LAC) would provide a significant level of protection in the CCNCA that is

currently unavailable. Management actions proposed in this plan are not expected to result in cumulative impact and would not add impact to other actions taking place in the planning area.